Case Report

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Managing Pier Abutment Using a Non-Rigid Connector as Treatment Modality: A Case Report

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ABSTRACT

Background: The most common clinical situation, either in the maxillary or mandibular arch, is of a missing first premolar and first molar, where the canine and the second molar are known as terminal abutments and second premolar act as a pier abutment. This type of clinical situation poses challenge to dentist if restored with missing teeth with FDP. It has been seen that terminal abutment has a rocking movement when in function, whereas pier abutment acts as a fulcrum. This may lead to repetitive dislodgement of FDP and failure of pier abutment. The best solution in the pier abutment is the use of non-rigid connector which redistribute the stress and prevent the pier abutment to act as fulcrum. This is a paper which present as case of rehabilitation of pier abutment using non rigid connector.

Keywords: Non rigid connector, Pier abutment, Abutment, Fulcrum, Occlusal forces.

INTRODUCTION

Connectors are the portion of fixed dental prosthesis that unites the retainer and pontic are considered as heartthrob of abutments since under occlusal forces maximum stresses are concentrated on them. Two types of connectors can be used in the fabrication of fixed dental prosthesis a) rigid connector and b) non rigid connector. Selection of right type of connector for a particular case will determine the success or failure of the prosthesis. The used of rigid connector in the fabrication of fixed dental prosthesis in clinical practice is much more due to minimum technical and laboratory expertise. But there are some clinical situations such as pier abutment where rigid connectors cannot be used and non-rigid connectors are recommended to relieve the stress on the pier abutment.

Pier abutment is also known as an intermediate abutment is defined as natural tooth located between the terminal abutments that serve to support the fixed or removable dental prosthesis. It has been postulated in literature that with the use of rigid connectors there are forces acting on the terminal abutments with pier abutments acting as fulcrum. The pier abutment because of its strategic position when subjected to Occlusal forces acting on the end of the prosthesis that will tend to lift the other end like class I lever, which created unfavorable stresses on the terminal abutment and ultimately failure of the prosthesis. Thus, the use of non-rigid connector in case of pier abutment is recommended.

The non-rigid connector is a broken stress mechanical union of pontic and retainer instead of usual rigid connector. The most commonly used non

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Fig 1: Intraoral examination of maxillary and mandibular arch.

Fig 2: Tooth Preparation followed by gingival retraction.

Fig 3: Plastic pattern for non rigid connector (Bego Co.)

Fig 4: Fabrication of wax pattern with plastic pattern attached.

Fig 5: Finished metal coping.

Fig 6: Metal Try in.

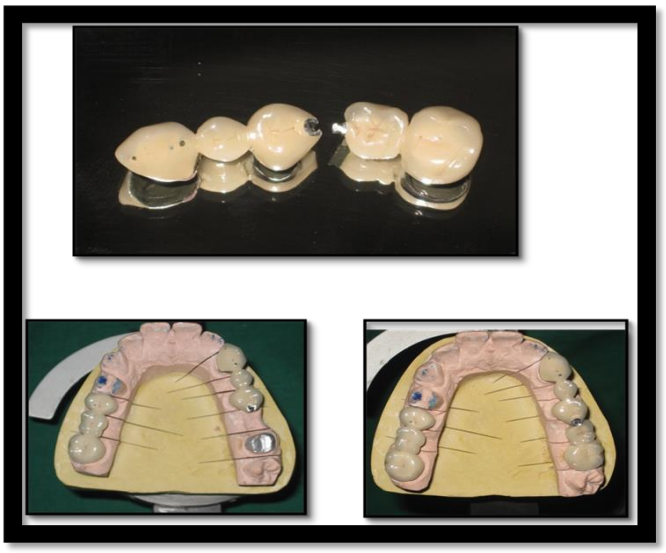

Fig 7: Bisque Try in Ready.

Fig 8: Final Cementation of FPD.

rigid design consist of T shaped key that is attached to the pontic and dovetail keyway placed within the retainer. The non rigid fixed partial denture transfer shear stress to the supporting bone rather than concentrating it to the connectors. It appears to minimize the mesiodistal torquing of the abutment while permitting them to move independently. The location of placement of non rigid connector is very important. It usually placed on the middle abutment. The keyway of the connector should be placed within the normal distal contours of the pier abutment and the key should be placed on the mesial side of the distal pontic.

The present case report presents the rehabilitation of pier abutment case with prefabricated plastic semi precision attachment.

CASE REPORT

A 27 year old patient came to the Department of Prosthodontics, Nair Hospital Dental College, Mumbai with the chief complaint of inability to chew food. The intraoral examination revealed missing maxillary right first molar and missing maxillary left maxillary first premolar and first molar with maxillary left canine and second molar as terminal abutment and left second premolar as pier abutment. The treatment options such as dental implants, fixed dental prosthesis and removable partial denture was given to patient and patient decided for fixed dental prosthesis as he doesn't want any surgical procedures for dental implant and removable prosthesis.

Hence it was decided to rehabilitate the left side missing teeth with fixed dental prosthesis with non rigid connector and for right side three unit FDP with rigid connector.

Step by step procedure

1. Diagnostic records were taken such as intraoral photographs, diagnostic models and intraoral periapical x-rays. Diagnostic mounting was done on semi adjustable articulator (Hanau Wide Vue) after taking face bow record and interocclusal records to check any occlusal interferences in existing condition. (Fig 1)

2. Diagnostic wax up was done so that the prosthesis would not create any occlusal interference during centric and eccentric movements.

3. The tooth preparation of maxillary canine, second premolar and molar of left side and second premolar and first molar of right side was done following the biomechanical principles of tooth preparation.(Fig 2)

4. Putty-wash impression was made using two stage techniques and working model was prepared using high strength type V gypsum product.

5. Provisional restoration was given to protect the prepared tooth surface for the comfort, function and aesthetic purpose

6. Working model was mounted on semi adjustable articulator with interocclusal record.

7. Wax pattern fabrication with prefabricated plastic pattern (Fig 3)attached on the distal side of pier abutment was done. It was kept in mind at the time of attachment of plastic pattern that parallelism should be maintained for proper path of placement of key into the keyway. This was accomplished with dental surveyor. (Fig 4)

8. Metal try in with female portion (keyway) attached on the distal surface of the pier abutment and male portion on the mesial surface of the pontic on the left side for proper path of placement and three unit prosthesis with rigid connector was done for marginal accuracy, proper fit and adequate interocclusal clearance. (Fig 5,6)

9. Ceramic build was done. Bisque try in was done. Cementation of anterior portion of three unit Bridge with keyway portion was done first followed by distal portion of two

unit bridge with key and three unit bridge on the other side. (Fig 7,8)

DISCUSSION

Fulcrum like action of the middle abutment results in the transmission of forces to the terminal retainers, thus leading to the failure of the weaker retainer with the use of rigid connector.[1] Nonrigid connectors when used judiciously can protect the pier abutment from deleterious forces and thereby increase the life span of FPD.

The four types of nonrigid connectors [2, 3] are as follows:

1. Dovetail (key-keyway) or (tenon-mortise) connectors
2. Loop connectors
3. Split connectors
4. Cross pin and wing connectors

Nonrigid connectors are indicated in fixed prosthodontics in the following situations[4]

1. Pier abutment, which acts as a fulcrum, causes failure of the weakest of the terminal abutments

2. Malaligned abutment, where parallel preparation might result in devitalization. The use of intracoronal attachments as connectors is advocated

3. Mobile teeth, which need to be splinted together with the fixed prosthesis. When multiple teeth are involved, interlocks can be used to cement smaller segments, thus deliver splinting effect

4. Long-span FPDs, which can distort due to the contraction and pull of porcelain on thin sections of metal framework and thus, affect the fit of the prosthesis on the teeth

5. When prognosis of the distal abutment is questionable and fabrication of the removable partial denture is the subsequent treatment step, nonrigid connector can resolve the problem of repeating restoration of remaining abutments

6. It could be used in cases of osseointegrated implants.

Contraindication for nonrigid connector: [5,6]

1. If the abutment presents significant mobility

2. If the span between the abutments is longer than one tooth because the stresses transferred to the abutment tooth under soldered retainer would be destructive

3. If the posterior retainer and pontic are opposed by a removable partial denture or an edentulous ridge while the two anterior retainers are opposed by natural dentition.

FPDs have been considered the standard of care before the advent of implant therapy. The long-term survival of FPDs has been reported to be 87% at 10 years and 69% at 15 years. Factors that predisposed to failure included nonvital anterior abutments and pier abutments.[7] Hence, in such cases, dental implant can be a better alternative to the patient provided the patient is medically fit with good bone support and financially affordable.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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